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XTE J0929−314 RXTE Chandra erg s^{-1}erg $\mathrm{cm}^{-2}\,\mathrm{s}^{-1}$count s^{-1}

X-ray Spectroscopy of the Accreting Millisecond Pulsar XTE J0929−314 in Outburst

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abstract We present the high-resolution spectrum of the accretion-powered millisecond pulsar during its 2002 outburst, measured using the Low Energy Transmission Grating Spectrometer onboard the Chandra X-ray Observatory. The spectrum is well fit by a power-law + blackbody model with photon index Γ=1.55±0.03, blackbody temperature $kT_{\rm bb}$ = 0.65±0.03 keV, and blackbody normalization $R_{\rm bb,km}/d_{\rm 10kpc}$ = 7.6±0.8. No emission or absorption features are found in the high-resolution spectrum, with a 3σ equivalent width upper limit of 5 eV for most of the 1.5–25.3 Å wavelength range. The neutral absorption edges are consistent with the estimated interstellar absorption along the line of sight to the source. We found no orbital modulation of the 2–10 keV X-ray flux, to a 3σ upper limit of 1.1%, which implies an upper limit on the binary inclination angle of i 85° for a Roche-lobe–filling companion. We also present the broadband spectrum measured over the course of the outburst by the Rossi X-ray Timing Explorer (). The spectrum of is also well fit with a power-law + blackbody model, with average values of Γ = 1.76±0.03, $kT_{\rm bb}$ = 0.66±0.06 keV, and $R_{\rm bb,km}/d_{\rm 10kpc}$=5.9 ± 1.3. No significant evolution in the spectral shape was found over the course of the outburst. The blackbody temperature and normalization varied, but were anti-correlated such that the blackbody flux remained constant, with the power-law normalization strongly correlated to the (decreasing) flux of the source. We find that the difference in power-law photon indices measured from and spectra can be explained by a change in the power-law photon index at low energies, E4 keV, and that the combined spectrum is better fit by a either a Comptonization + blackbody model or a broken power-law + blackbody model.